Data sheet
L-9517-9305-09-A

RENISHAW
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RSLM high accuracy incremental linear stainless steel scale



- **Total accuracy of ±4 µm over 5 m**
- **Available in defined lengths up to 5 m**
- **Coilable for simple storage and handling**
- ***IN-TRAC* auto-phase optical reference mark**
- **Robust special composition stainless steel with defined coefficient of thermal expansion: 10.1 ±0.2 µm/m/°C @ 20 °C**
- **Dual limits provide on-scale end-of-travel indication**

RSLM20 high accuracy stainless steel scale is compatible with Renishaw's VIONiC™ and TONiC™ range of high performance encoders, offering advanced features including dynamic signal processing and the *IN-TRAC*™ optical reference mark.

RSLM20 scale is available in lengths up to 5 m with an overall accuracy better than ±4 µm on 5 m lengths – an industry first! Combined with readheads featuring ultra-low Sub-divisional error (SDE), unique filtering optics, resolutions down to 1 nm and simple installation and setup, RSLM20 provides all the performance of a fine pitch system with the benefits of a 20 µm encoder.

RSLM20 offers the ease of use of a tape scale yet the performance of a glass spar; the scale can be coiled for simple storage and handling yet behaves as a spar once uncoiled. Available with a number of *IN-TRAC* reference mark options and a choice of mechanical or adhesive mounting, RSLM20 is perfect for long-travel applications where metrology cannot be compromised.

www.renishaw.com/opticalencoders

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RSLM scale specifications

Description	Hardened martensitic stainless steel spar scale for use with VIONiC and TONiC readheads
Pitch	20 µm
Form (height × width)	1.5 mm × 14.9 mm (excluding adhesive)
Accuracy (at 20 °C)	±1.5 µm for lengths up to 1 m. ±2.25 µm for lengths from 1 m to 2 m. ±3 µm for lengths from 2 m to 3 m. ±4 µm for lengths from 3 m to 5 m. (includes slope and linearity) Calibration traceable to International Standards
Coefficient of thermal expansion (at 20 °C)	10.1 ±0.2 µm/m/°C
Mass	172 g/m
Available lengths	20 mm to 5 m (available in increments of 10 mm)
Measuring length	See 'RSLM20 scale measuring length' on page 8
Mounting	Epoxy datum point and adhesive tape or mechanical datum clamp and mounting clips.
Storage	Lengths over 1.13 m are coiled (> 600 mm diameter)

For further information on installation and mounting options, refer to the following documentation:

Encoder system	Document name	Document part number	Website link
VIONiC	*VIONiC™ RSLM20/RELM20 high-accuracy incremental linear encoder system* installation guide	M-6195-9232	**www.renishaw.com/vionicdownloads**
TONiC	*TONiC™ RSLM20/RELM20 high-accuracy incremental linear encoder system* installation guide	M-9653-9225	**www.renishaw.com/tonicdownloads**

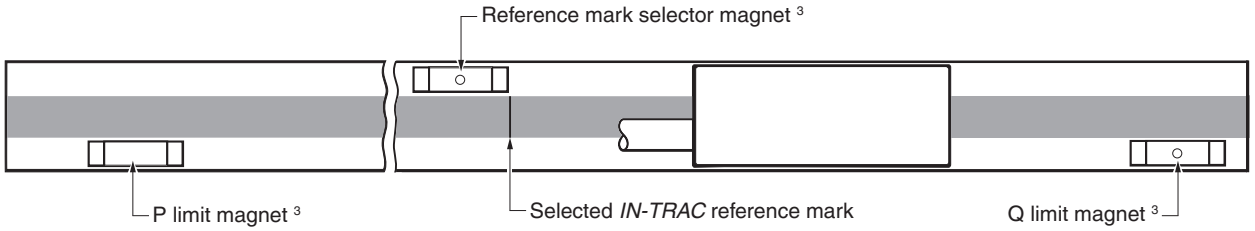
Reference mark

Type		*IN-TRAC*™ autophase optical reference mark; no physical adjustment required
Position	RSLM20 [1]	Midpoint of the scale length
	RSLE20 (option A) [1]	20 mm from the end of the scale length (for use with 10 mm limit magnets)
	RSLE20 (option B) [1]	70 mm from the end of the scale length (for use with 20 mm, 25 mm, and 50 mm limits)
	RSLC20 [2]	Selectable reference marks every 200 mm (using reference mark selector magnet)
	RSLR20	No *IN-TRAC* reference marks
Phasing		Auto-phased by readhead calibration routine
Repeatability		Repeatable to unit of resolution throughout the specified temperature and speed range

Limit switches

Type	Magnetic actuators; with dimple triggers Q limit, without dimple triggers P limit (see image below)
Trigger point	The limit output is nominally asserted when the readhead limit switch sensor passes the limit magnet leading edge, but can trigger up to 3 mm before that edge
Mounting	Customer placed at desired locations
Repeatability	< 0.1 mm

NOTE: Limit magnets are available in 10 mm (standard), 20 mm, 25 mm, and 50 mm lengths and provided on a back plate with self-adhesive tape.



[1] For RSLM20 and RSLE20 scales VIONiC and TONiC readheads should be ordered with all reference marks output (No reference mark selector is required.)

[2] For RSLC20 scales VIONiC and TONiC readheads should be ordered with selected reference marks output.
(Reference mark selector is required at chosen reference mark location.)

[3] The reference mark selector and limit magnet locations are correct for the readhead orientation shown.

Compatible readheads

	VIONiC	TONiC
		
Outputs	Digital resolutions from 5 µm to 2.5 nm direct from the readhead	Analogue 1 Vpp. Digital resolutions from 5 µm to 1 nm when connected to a Ti, TD or DOP interface.
Sub-divisional error (typical)	< ±15 nm	±30 nm
Jitter (RMS)	Down to 1.6 nm	Down to 0.5 nm
Maximum speed	12 m/s	10 m/s
UHV variant	No	Yes [1]
Functional Safety variant	No	Yes [2]

Readhead features

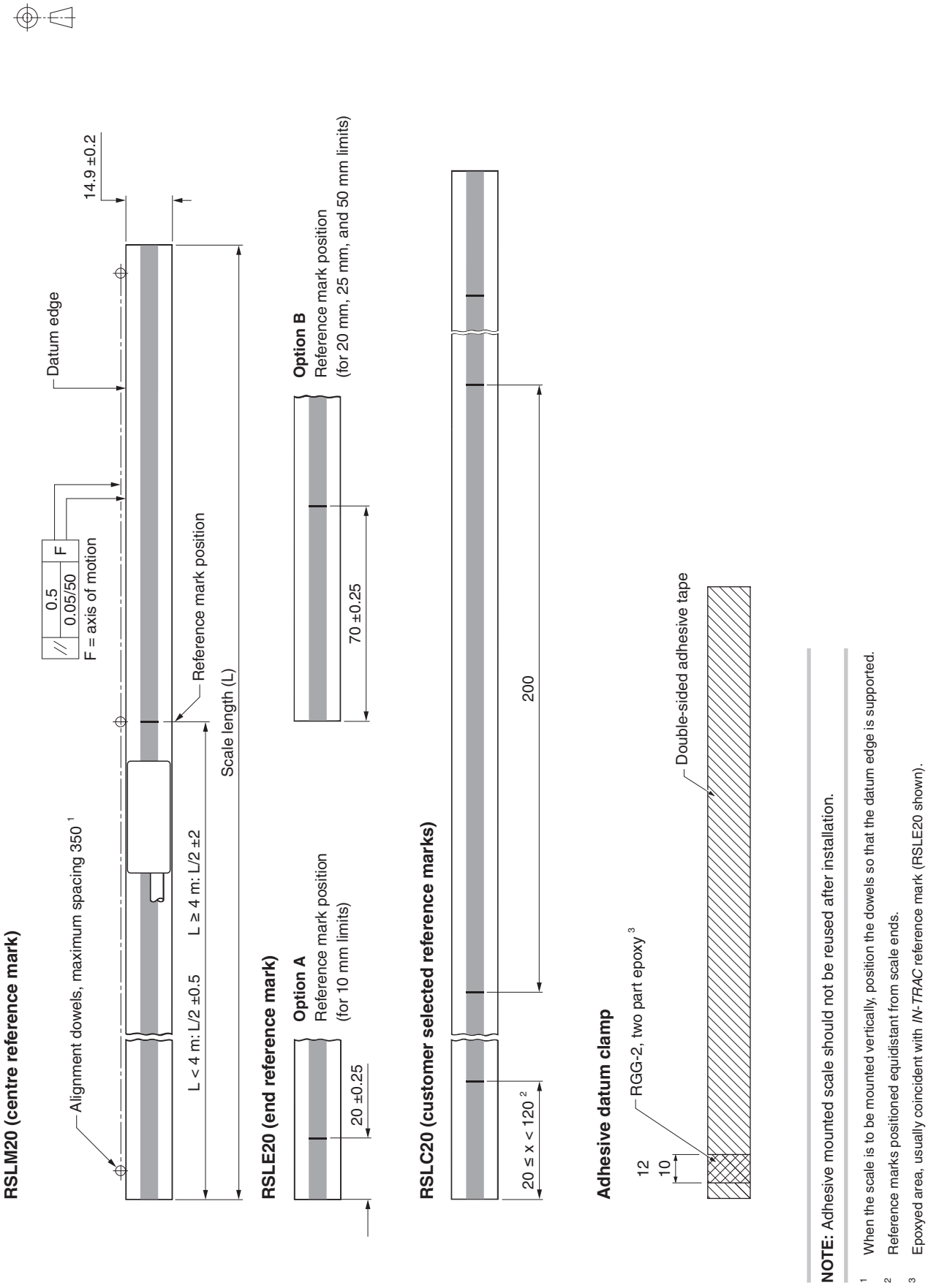
- Filtering optics and Auto Gain Control for high reliability and solid Lissajous signals.
- Dynamic signal processing ensures ultra-low sub-divisional error (SDE). Result: smoother scanning performance.
- High signal-to-noise ratio provides ultra-low jitter for optimum positional stability.
- Auto-phasing of *IN-TRAC* reference mark.
- Clocked outputs ensure optimised speed performance for all resolutions, for a wide variety of industry-standard controllers.
- DOP Dual output interfaces available to provide simultaneous analogue and digital outputs (TONiC systems only).

[1] See *TONiC™ UHV encoder syste*m data sheet (Renishaw part no. L-9517-9426) for further details.

[2] See *TONiC™ Functional Safety incremental encoder system* data sheet (Renishaw part no. L-9517-9878) for further details.

RSLM scale installation drawing - adhesive mounted

Dimensions and tolerances in mm



NOTE: Adhesive mounted scale should not be reused after installation.

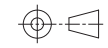
1 When the scale is to be mounted vertically, position the dowels so that the datum edge is supported.

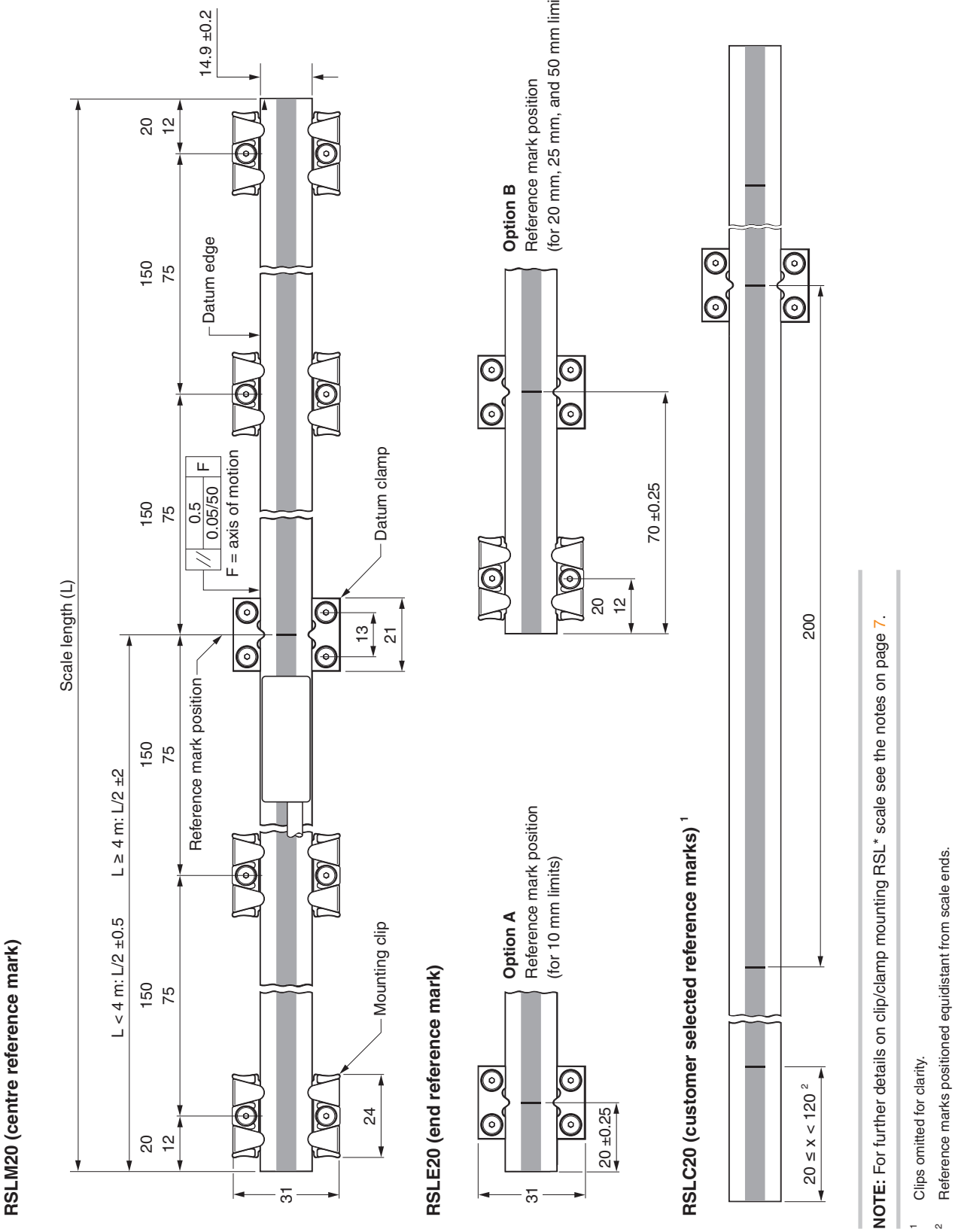
2 Reference marks positioned equidistant from scale ends.

3 Epoxyed area, usually coincident with *IN-TRAC* reference mark (RSLE20 shown).

RSLM scale installation drawing - clip/clamp mounted

Dimensions and tolerances in mm





NOTE: For further details on clip/clamp mounting RSL* scale see the notes on page 7.

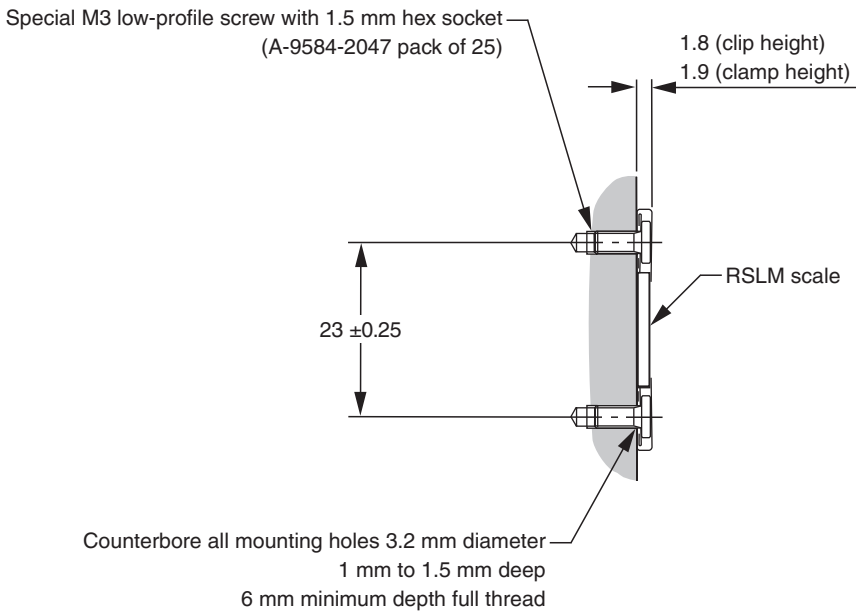
1 Clips omitted for clarity.

2 Reference marks positioned equidistant from scale ends.

Clip/clamp mounting

Dimensions and tolerances in mm

Mounting clip/Datum clamp

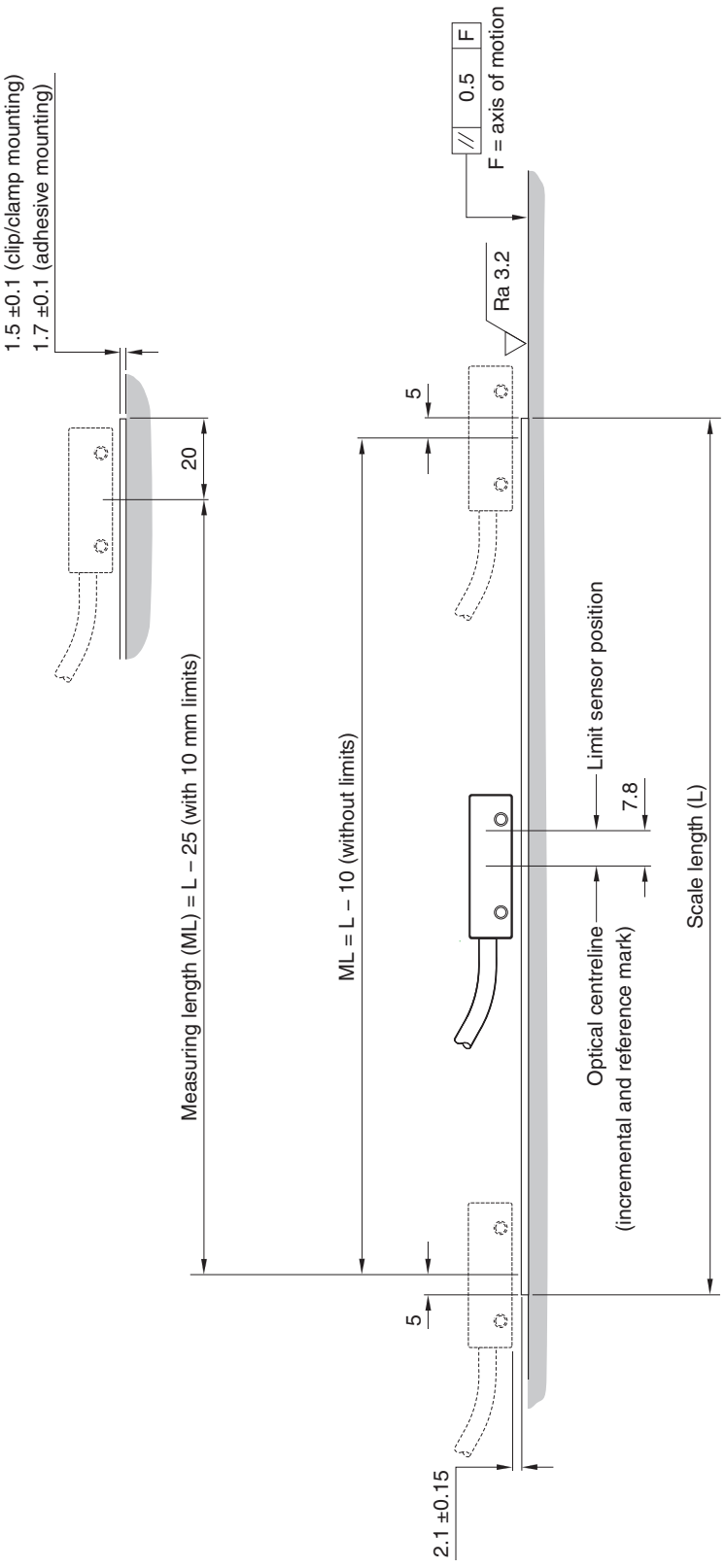


NOTES:

- The datum clamp is usually coincident with the selected *IN-TRAC* reference mark. However, the position is user selectable depending upon application.
- For lengths 80 ≤ L ≤ 190 ensure that the scale is clamped or clipped in the middle as well as at both ends.
  - The installation should use the least number of clips as possible.
  - For lengths not specified, contact your local Renishaw representative for further advice.
- For optimum performance the readhead should be installed close to nominal geometry.
- Care should be taken to ensure sufficient clearance between the readhead/mounting bracket and clips/datum clamp.
- Only special low-profile screws should be used. Screws are provided with all clips/datum clamps, and spares can be supplied if required.

RSLM20 scale measuring length

Dimensions and tolerances in mm



Scale part numbers

20 µm pitch stainless steel spar scale

Series	Reference mark	Available lengths	Available in increments of	Part number (where xxxx is the length in mm) [1]
RSLM20	Single *IN-TRAC* reference mark at mid-point of scale length	20 mm to 5000 mm	10 mm	A-9682-xxxx
RSLE20 (option A)	Single *IN-TRAC* reference mark 20 mm from scale end	50 mm to 5000 mm	10 mm	A-9683-xxxx
RSLE20 (option B)	Single *IN-TRAC* reference mark 70 mm from scale end	130 mm to 5000 mm	10 mm	A-9689-xxxx
RSLC20	Multiple *IN-TRAC* reference marks spaced every 200 mm. Reference mark is customer selectable with selector magnet. [2]	280 mm to 5000 mm	10 mm	A-9686-xxxx
RSLR20	No *IN-TRAC* reference mark	20 mm to 5000 mm	10 mm	A-9684-xxxx

[1] Ordering A-9682-0070, for example, will result in a length of 70 mm of RSLM20.

[2] Only the calibrated reference mark is bi-directionally repeatable.

Accessory part numbers

Reference mark and limit magnets [1]

Part description	Part number	Product image
10 mm long reference mark selector magnet [2] (Adhesive mounted)	A-9653-0143	
10 mm long Q limit switch actuator magnet (Adhesive mounted)	A-9653-0139	
10 mm long P limit switch actuator magnet (Adhesive mounted)	A-9653-0138	
Magnet applicator device (Aids positioning)	A-9653-0201	

Self-adhesive mounting accessories

Part description	Part number	Product image
Adhesive backing tape (5 m) (nominal thickness 0.2 mm)	A-9584-2111	
Adhesive backing tape applicator Aids the application of the adhesive backing tape to the scale	A-9584-0601	
RGG-2 two part epoxy adhesive Used to create a datum point	A-9531-0342	

[1] Longer limit magnets are available. Contact your local Renishaw representative for more information.

[2] The selector magnet is only required for selecting an *IN-TRAC* reference mark on RSLC scale.

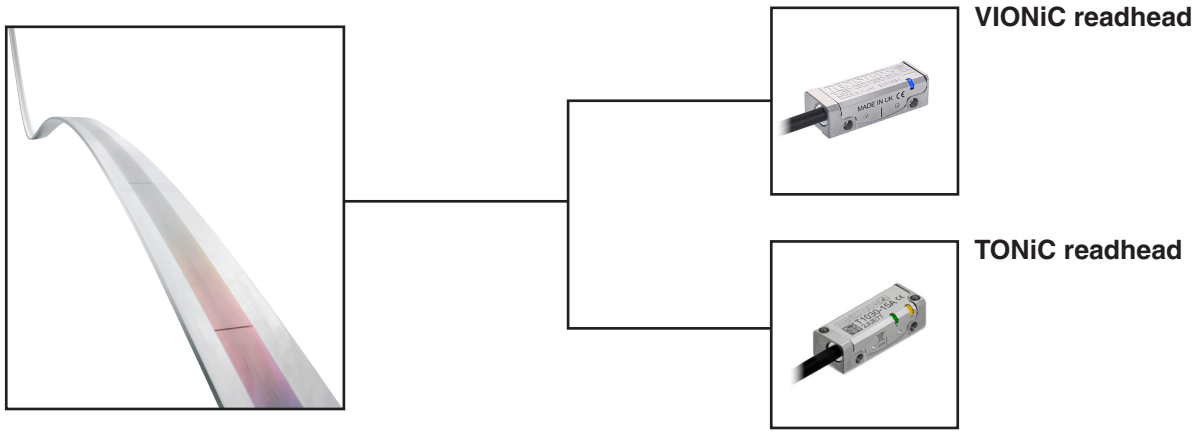
Clip/clamp mounting accessories

Part description	Part number	Product image
Mounting clips [1]	A-9584-2049	
Datum clamp kit [1]	A-9584-2050	
Replacement M3 screws (pack of 25)	A-9584-2047	
Spare clip setting shim	M-9584-0928	

[1] UHV and extra wide clip/clamp accessories are available. Contact your local Renishaw subsidiary for more information.

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Compatible products



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